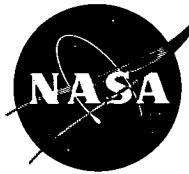


# NASA TECH BRIEF

## NASA Pasadena Office

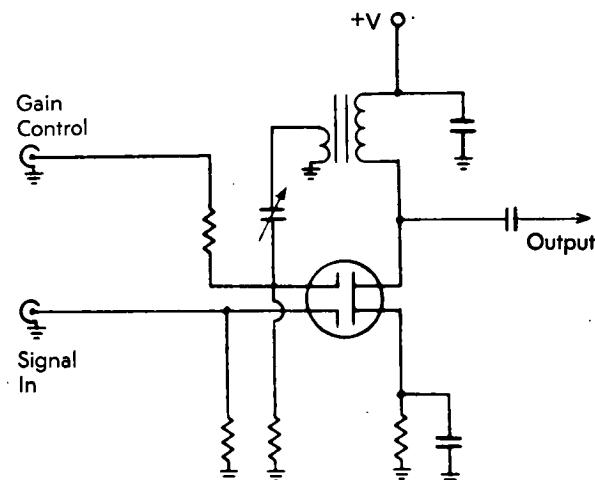


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### Low Phase-Shift Amplifier

#### The problem:

To decrease the phase shift which occurs in the output of an amplifier when the automatic gain control (AGC) is changed.



#### The solution:

Use a broadband transformer to neutralize the distributed capacity between the drain and control gate of a dual-gate MOSFET.

#### How it's done:

The single-stage MOSFET amplifier shown in the diagram is identical to a standard neutralized amplifier except that the neutralization provided by a broadband transformer is applied to the AGC gate instead of the signal gate; this arrangement cancels effects attributable to the capacitance existing between the

control gate and the drain.

There is an RC network which consists of the drain-to-control-gate capacity and the channel resistance. The channel resistance varies with a change of voltage on the control gate and causes the RC time constant to change; as a result, there is a change of phase from input to output of the amplifier. Neutralization of the drain-to-control-gate capacity minimizes the phase change induced by variation in AGC.

The amount of phase shift *vs* gain in a three-stage amplifier was found to be  $\pm 0.3^\circ$  for a gain change from 10 dB to 50 dB. The amplifier will handle signal levels up to about one volt rms. The noise figure is about 9 dB at 10 MHz when driven from a 1000-ohm source.

#### Note:

Requests for further information may be directed to:

Technology Utilization Officer  
NASA Pasadena Office  
4800 Oak Grove Drive  
Pasadena, California 91103  
Reference: TSP72-10185

#### Patent status:

NASA has decided not to apply for a patent.

Source: George F. Lutes and  
Richard C. Coffin of  
Caltech/JPL  
under contract to  
NASA Pasadena Office  
(NPO-11663)

Category 01